Vision Appliances

VA2x, VA3x
Dual Camera Vision Appliance

and

VA1x Single Camera Vision Appliance

User's Reference Manual

405-00020-00
Revision 08
11 March 2010

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and
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Certifications

FCC Compliance Statement

This product has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and may cause harmful interference to radio communication.

European Declaration of Conformity

This product has been tested to comply with the EC Directive for a class B digital device. It has been tested and found to comply with EN55022/CISPR22.

CFR 21 Part 11

This product provides the tools needed for users to implement an auditing program that could be in compliance with CFR 21 Part 11. These tools include:

- System or software backup and restore – VA15, VA20, VA30
- System software security (password loging and access limits) – iNspect and Sherlock software
- Protection of system backup files from modification – VA15, VA20, VA30
- Record of actions by users with time stamp information – iNspect software
- Time stamp information on data output – iNspect and Sherlock software

Handling and Operating Precautions

Care should always be exercised when handling and operating your Vision Appliance system. Even though the system is encased within a rugged, industrial enclosure, incorrect use or handling can result in damage to your investment. To prevent this, we recommend you ***avoid the following***:

- "Hot-plugging" cables and devices. Be sure to shut the system down and remove power before connecting or disconnecting anything to it.
- "Free-standing" operation. Whenever possible, we advise mounting the system to prevent it from falling accidentally. DIN-rail mounting hardware is provided.
- "Pulling power" while operating. Whenever possible, gracefully shut down the system if at any time you need to remove power.
- Operating the system in a "hazardous environment". The system is not NEMA rated.

ElectroStatic Discharge

Avoid the damage that ESD can cause. Never expose the internal electronics to a potentially hazardous environment by opening the enclosure. Doing so may cause serious damage.

User Service Warning

This product has no field-replaceable components. Tampering with the unit will void the product warranty.

Warranty

DALSA warrants the Vision Appliance against defects in materials and workmanship for a period of one year from the date of delivery. DALSA and its representatives expressly disclaim any and all other warranties.

Your sole remedy shall be repair or replacement of the Vision Appliance product and associated optional components, provided that the defective product is returned within the warranty period.

If you need to return the system, you must contact the DALSA representative who sold you the system. Do not return your product to DALSA without authorization.

DALSA assumes no liability for damages resulting from the use of this manual.

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1. INTRODUCTION

Congratulations on your purchase of the Vision Appliance! You now own a powerful, integrated system that can be applied to a diverse range of industrial vision applications. As a valued DALSA customer, you can now look forward to easily implementing robust solutions, *the Vision Appliance way.*

Overview

The Vision Appliance is an integrated platform that includes processing, display, image capture, networking, communication and industrial I/O. These standard hardware components, encased within an aluminum chassis, provide the basis for a powerful industrial vision system.

About This Manual

This manual will assist you with the installation and setup of your Vision Appliance and the inspection software. It describes what the product supports and how to connect the external interfaces.

- In most instances, VA1x/VA2x/VA3x or "Vision Appliance" will mean the whole product line, including the VA15, VA20, VA21, VA30 and VA31.
- When a description applies to only one or more *specific models*, the names will be in Bold: **VA15**, **VA20, VA21, VA30, VA31, VA15/20/30** or **VA21**&**VA31**.

If your Vision Appliance questions are not answered in this reference, please contact your local DALSA representative who will be happy to answer or direct your question to the appropriate factory resource.

In the unlikely event of failure, the warranty and return information is included in Section 3, starting on page 4.

The vertical bars are "change bars" and mark additions or changes from the previous version of this manual.

2. BEFORE YOU BEGIN

Product Verification

Before getting started, please take a few minutes to verify that your shipment is complete and in good condition. If your product has been visibly damaged during shipment or is missing parts, please contact your local DALSA representative immediately.

Environmental Requirements

For reliable operation, this product should be operated within the following environmental conditions:

- Stable ambient temperature from 10°C to 45°C
- Relative humidity to 90% non-condensing
- Stable ambient lighting
- No excessive vibration or mechanical shock
- No contact with corrosive agents
- No liquid splash
- Dust and dirt controlled (regular maintenance checks)

3. SUPPORT AND MAINTENANCE

Support

DALSA provides the following support resources:

Documentation

In addition to this manual, the following information ships with the product:

Online help – "fingertip help" is available on every screen ("panel") of the User Interface.

DALSA/IPD Website

Our **www.dalsa.com/ipd** website is updated regularly with the latest information.

Factory Support

Call, fax, or email your local representative, or the DALSA IPD Headquarters, for product support.

DALSA IPD
700 Technology Park Drive
Billerica, MA 01821

Main Number: +1.978.670.2002
FAX: +1.978.670.2010
Email: support.ipd@dalsa.com
Internet: http://www.dalsa.com/ipd

To assist our staff in supporting you better, please have the following information available:

1. Name of DALSA/IPD representative who sold you the product.
2. Serial number of the unit.
3. Description of how the product is being used (application and environment).
4. Description of the problem and what you were doing when the problem occurred.
5. Exact wording of any error or warning messages that the product displayed.
6. What you have done to try and solve it.

Maintenance

For continued product health and reliable results, DALSA IPD recommends regular maintenance checks to keep the equipment free of dust and dirt. Use anti-static compressed air to blow dust off the Lens and use a lens cloth or cleaner to wipe away grease, oil, or fingerprints.

4. PRODUCT OVERVIEW

Product Description

The Vision Appliance is an optical inspection appliance designed for high-speed applications requiring one or two views of a part. Both easy to learn and deploy, the Vision Appliance is an ideal choice for manufacturers who need to ensure the best possible quality in their product.

The **VA15, VA20** and **VA30** is a stand-alone product. Remote connections are available for control and monitoring. All required software, user interfaces and communication controls are resident in the product. The **VA21, VA31** provides local setup via keyboard, mouse and monitor, in addition to remote access.

The Vision Appliance includes the iNspect software user interface. iNspect is a powerful inspection tool that can be applied to a range of application challenges. Pre-inspection setup requires focusing the camera lens and adjusting the light source to optimize image picture quality (highlight features of interest). This is an important step to assure accurate and repeatable results.

Inspections are quickly set up by applying instances of tools to an image template captured by each of the cameras. Once configured with acceptable tolerances, the device is ready to start inspecting. In run mode, results and images are posted to the local monitor continuously. At the same time, outputs control downstream part handling and results are communicated to related equipment via RS-232 or Ethernet.

The Vision Appliance accommodates both translation (X,Y) and 360° rotation of parts. While fixturing is recommended wherever possible, it is not a requirement for operation of this product. iNspect can store over 64 solutions, 8 of which can be switched externally through user inputs for line changeovers.

Included with iNspect is the sister product iLabel. This is a label inspection tool that was designed primarily for the packaging industry. It allows you to learn and inspect the quality and placement of labels on packaged goods.

Typical Applications

The Vision Appliance can be applied to solve a diverse range of manufacturing problems across a multitude of industries. Typical applications include:

- Detect missing or incorrect components in a package or assembly
- Verify precision measurements
- Inspect front and back surfaces simultaneously (not VA15 single camera appliance)
- Track or verify products – barcode or 2D matrix
- Read and verify characters (OCR)
- Align PCBs – locate and report position of multiple fiducials
- Locate and count objects
- Verify label position, fill level, cap and safety seal on bottles
- Check for surface defects

5. INSTALLATION

Pre-Installation Checks

1. Read the handling and operating precautions in Section 2.
2. Check that all essential components are present:
   a. The VA1x/VA2x/VA3x unit
   b. Monitor, keyboard and mouse (only required for local setup using the **VA21** or **VA31**)
   c. Camera(s) and associated cable(s)
   d. C-Mount Lens for each camera
   e. 24 VDC power supply with a minimum 1.5 A output
   f. Light Source, cable and power supply if necessary
   g. Sensor trigger and cable (if required)
   h. Decision trigger and cable (if required)

Installing the Hardware

Software configuration differs according to which version of the VA1x/VA2x/VA3x you have purchased. The standard version, **VA15, VA20 & VA30** is accessed and setup through the Ethernet port using the Microsoft web browser. In this mode, the **VA15, VA20 & VA30** acts like a true appliance, serving the application to the laptop or connecting PC. This method of access eliminates any software version control problems because the application is resident on the hardware.

The **VA21 & VA31** provides a similar remote access capability, but also allows you to access and set up the unit locally using keyboard, mouse and monitor. This is good for users that don't have access to a network or laptop computer.

The following installation guideline applies to both hardware versions:

1. Mount the Camera(s) and Vision Appliance Chassis in a location free from excessive shock, moisture, and vibration. The Vision Appliance comes with a standard DIN rail mount. You can optionally remove these brackets and use your own custom mounting hardware.
   A drawing of the camera mounting locations is included on page 27. Tripod adapters are also available for the cameras.
2. Connect a standard Monitor (1024 x 768 resolution preferred) to the Monitor connector.
3. Connect a mouse and keyboard, using either USB connectors. This is only relevant on the **VA21** and **VA31** models.

4. Connect the Serial Port connection as required (see "Serial Port Connection" on page 17).
5. Connect the Ethernet connection as required (see "Network Connection" on page 17).
6. Wire the required outputs from the I/O connectors to the sensors, PLC and directional control devices that you are using (see input pinout on page 19, and output pinout on page 22).
7. Thread the lens onto each camera lens mount.
8. Attach a camera cable to each camera and connect them to the camera ports on the VA20. See "Camera (Video) Connections" on pages 16 & 17.
9. Mount the light source and connect the strobe controller (if required) to the strobe output of the Output connector (see output pinout on page 22).
10. Before powering on the unit, see "Verify Installation and Begin" on page 25.

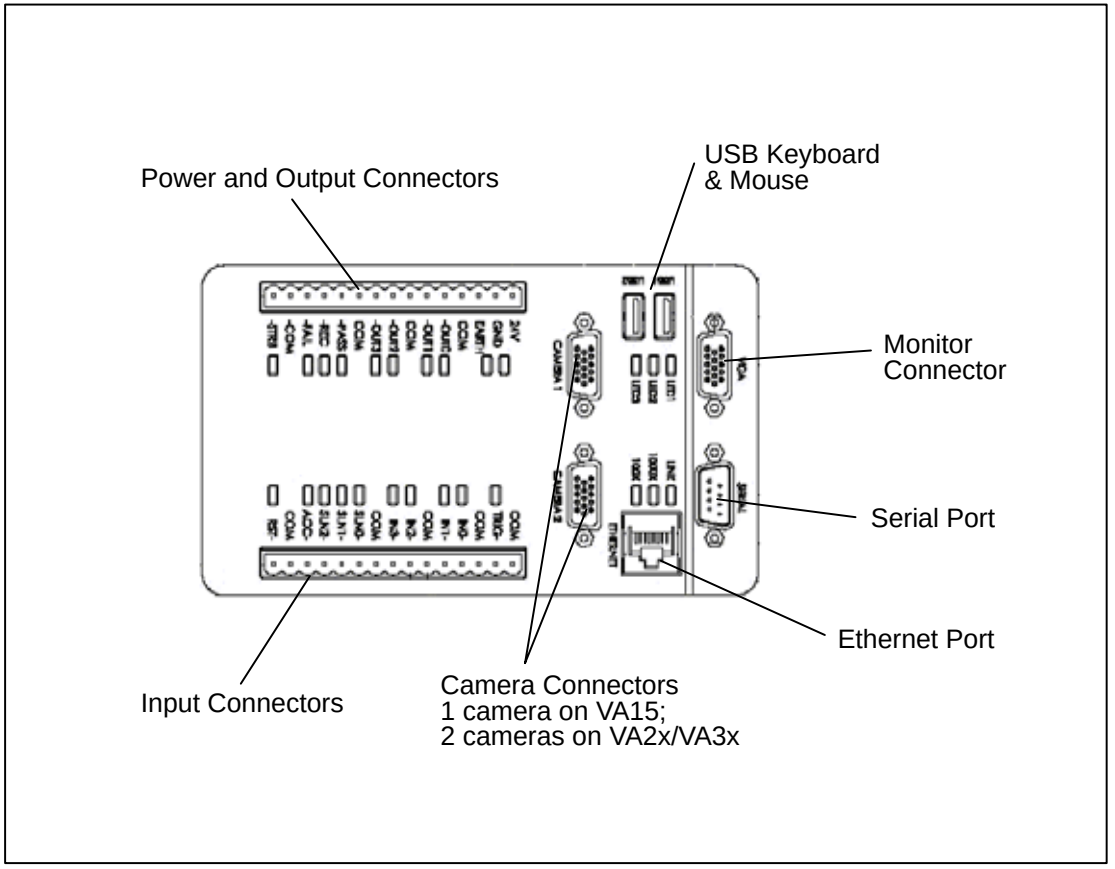

Figure 1. Interface Panel

Interface Specifications

Camera (Video) Connections

One of the benefits of the Vision Appliance is that it supports different format cameras or sensors. This means that the hardware can be easily adapted to changing inspection requirements. The standard camera that ships with the product has a resolution of 640x480 pixels, but this is expandable up to 1392x1024. DALSA offers cameras for use with our Vision Appliances, some of which are referenced below.

The Vision Appliance interfaces up to 2 synchronous cameras, supporting progressive scan analog with standard or double-speed capabilities. (VA15 one camera only). Maximum image resolution is 1392x1024 per camera. The following cameras are offered by DALSA/IPD. Consult the factory for alternate choices if required.

NOTE *With a single camera, maximum resolution is 1600x1200. With 2 cameras maximum resolution is 1392x1024.*

Recommended Camera List

Model	*Resolution*	*Type*	*Full frame speed*	*Body Size*
TM1 & TM2	640x480	Analog-mono	60 fps	1"x1"x1.5"
DM1024 & SM2	1024x768	Analog-mono	29 fps	1"x1"x1.5"

TM Camera Cable

This cable is compatible with the TM1, TM2, SM2 and DM1024 progressive scan analog cameras that ship with the product. This cable is also compatible with the CV-A1 and CV-A11 cameras.

TM Cable Pin-Out

12-pin Camera Connector	*Signal Description*	*15-pin Appliance Connector*
1	12 Volt Return (ground)	10
2	+12 Volts DC	15
3	Analog ground	7
4	Video input (single-ended)	2
5	Digital ground	4
6	HDRIVE horizontal sync	13
7	VDRIVE Vertical sync	14
8	Digital ground	5
9, 10	no connection	–
11	Frame Reset to camera (Exposure)	9
12	Digital ground	5

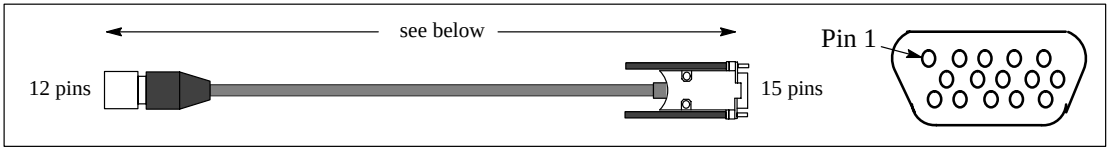

Figure 2. TM Camera Cable

Part Number	*Cable Length*
A-CAB-NSII-C30	3 meters
A-CAB-NSII-C31	5 meters
A-CAB-NSII-C32	10 meters

Camera Switches

The settings of the switches on the back of the cameras should not be changed. For reference only:
TM1 switches 1, 6, and 10 are ON, all other switches are Off.
TM2 switches 2, 7, and 10 are ON, all other switches are Off.
SM2 switches 1 through 7, 9 and 10 are Off, 8 is ON; 75Ω is Off, HD/VD set to EXT.
DM1024 switches 5, 6, and 10 are ON all other switches are Off.

Network Connection

If your system is to be connected to a LAN (Local Area Network), connect a network cable to the RJ45 Ethernet jack. The Vision Appliance supports Gigabit Ethernet (1000 BaseT) Fast Ethernet (100 BaseT) and Twisted Pair Ethernet (10 BaseT). If you plan to use Gigabit or Fast Ethernet, use a Category 5 (UTP5) cable.

If the Vision Appliance is part of a peer-to-peer configuration (for example, connected directly to a PC, without a Network) you will need to use a special crossover cable to connect to the second device. A crossover cable is available optionally from DALSA IPD, or at any computer supply store.

The Vision Appliance is factory configured with a Static (fixed) IP Address of **192.168.0.100**. This may not be compatible with your PC or Network, and you may have to change it, or have your network administrator change it. Step-by-step directions are included in this manual.

Serial Port Connection

The Vision Appliance has one RS-232 compliant serial port. The serial port is typically used for passing results to a third party device, such as a PLC.

Status LEDs

The Vision Appliance provides 26 LEDs on the interface panel as visual health and status indicators (see Figure 1).

A RESET function is available on the Input I/O connector. When activated, the system will re-boot. The Reset LED should come on at the start of the Reset operation, and then go off. If the LED remains on, the unit has not exited the Reset condition.

The Green LED beside +24V indicates CPU health or status. When the CPU is booting, this LED should flash, and LED1 and LED2 should turn on and stay on (indicating the FPGA has loaded correctly) until a program or application (iLabel or iNspect) changes their behavior. The **VA15, VA20** & **VA30** launches iNspect or iLabel after booting. The **VA21 & VA31** boots to a Windows desktop, and the CPU Health LED remains flashing.

As the (iNspect or iLabel) application opens, two of the LEDs start flashing. These are the "Heartbeat" (LED1) and "End-of-Acquire" (LED2) status. The Heartbeat has a 2 second cycle, at 50% duty. The End-of-Acquire cycle depends on the timer or external trigger.

For more information on LED status operation please refer to page 24.

I/O Connections

The digital I/O is accessible through two 15-pin EURO style connectors. The top connector (as viewed from the front) interfaces the inputs and the bottom connector the outputs. Right-angle mating plugs ship with the unit for easy wiring to panels.

Inputs

The inputs are opto-isolated, polarity insensitive pairs (NOTE: some common pins are shared) that can be connected to either sourcing (PNP) or sinking (NPN) outputs. They require no external pull-up or pull-down resistors and can accept input voltage levels from 2 Volts to 24 Volts. Each input has a variable programmable switching threshold and de-bounce circuit for improved noise immunity. The switching threshold is programed through the IFC Camera Configurator. The default threshold is 3 Volts. Figure 4 (page 20) illustrates several input connection options.

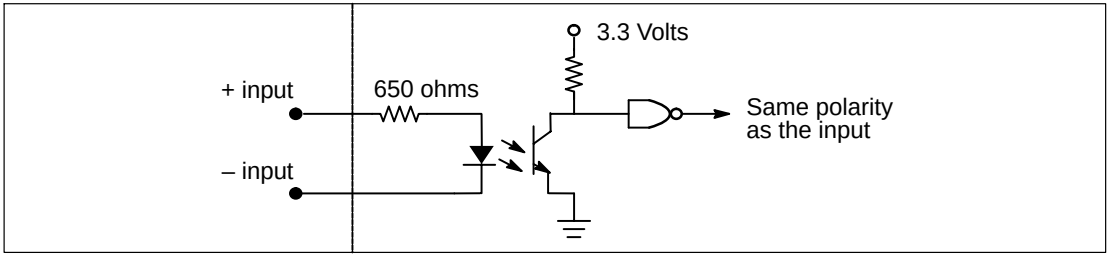

Figure 3. Opto-Isolated Inputs

Input Electrical Characteristics

Signal state	*Min.*	*Max.*
Low (Inactive)	0 V	0.8 V
High (Active)	2.4 V	60 V *
Turn ON current	1 mA	
Isolation		5000 V
Max Current		50 mA
Switch point	2 V	10 V
De-bounce	2 us	500 us
Input Response	1 us	

* observe maximum current specification. Current limiting resistor required above 24 Volts.

Input Connector Pinout

Pin #	*Label*	*Description*
1	COM	Common for Trigger inputs
2	TRIG	Sensor Trigger input
3	COM	Common for Inputs 0 and 1
4	IN0	Input 0, general purpose input or decision trigger input
5	IN1	Input 1, general purpose input
6	COM	Common for Inputs 2 and 3
7	IN2	Input 2, general purpose input
8	IN3	Input 3, general purpose input
9	COM	Common for Solution inputs
10	SLN0	Solution select input 1, BCD value for current solution
11	SLN1	Solution select input 2, BCD value for current solution
12	SLN2	Solution select input 3, BCD value for current solution
13	ACC	Accept, Latch for current solution select
14	COM	Common for Reset
15	RST	Input reset, software configurable as part/soft/hard reset.

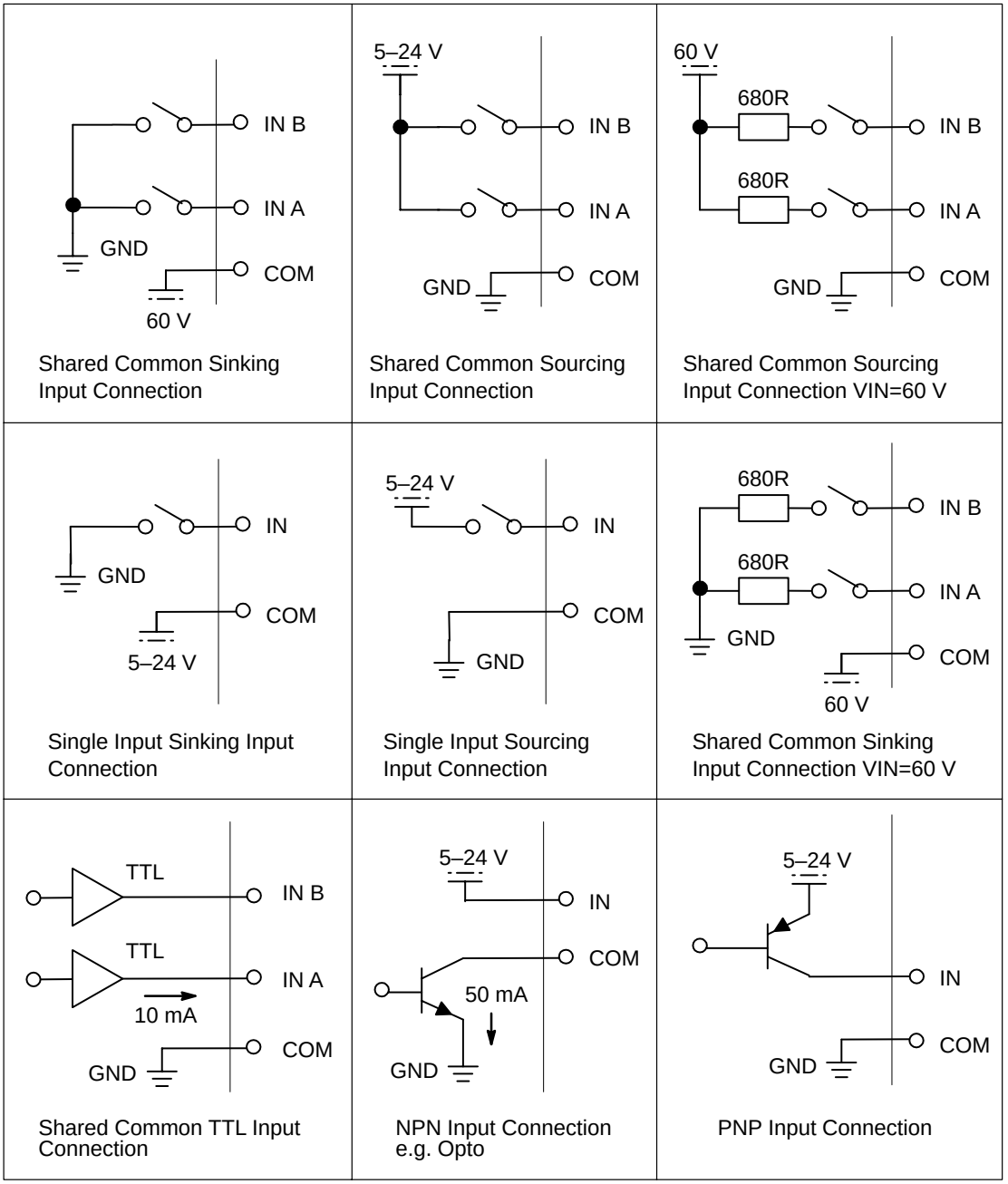

Figure 4. Input Configurations

Solution Switching Using I/O

Solutions can be switched through the input connector, for quick line changeovers. You supply a 3-bit "Solution ID" number and a "load" signal using 3 switches and a button. The necessary circuit is illustrated below, and the Input Connector pin numbers are given.

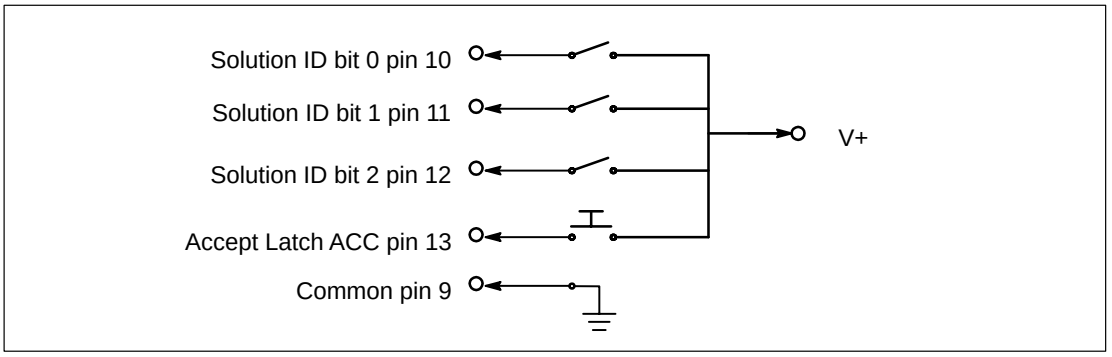

Figure 5. Solution ID Switching Circuit

If there is no ID switch circuit attached, the iLabel or iNspect application opens with Solution 00 running. If an ID switch circuit is attached, the application starts/opens running the Solution ID indicated by the switch.

Outputs

The outputs are opto-isolated solid-state relays that can operate up to 30 Volts. They can be visualized as mechanical switches. They are analog, polarity insensitive and exhibit no contact bounce. The outputs can drive both AC and DC loads providing the current and voltage limits are observed. Figure 6 (page 22) illustrates output connection options.

Output Electrical Characteristics

Signal state	*Min.*	*Max.*
Voltage	5 V	30 V
Current		300 mA
Rise time		2 ms
Fall time		2 ms

Output Connector Pinout

Pin #	*Label*	*Description*
1	24V	Power input supply voltage 24 V
2	GND	Power input ground 0V
3	ERTH	EARTH connection for system
4	COM	Common for Output 0 and 1
5	OUT0	Output 0, general purpose output
6	OUT1	Output 1, general purpose output
7	COM	Common for Output 2 and 3
8	OUT2	Output 2, general purpose output
9	OUT3	Output 3, general purpose output / Running status
10	COM	Common for PASS/FAIL/RECYCLE outputs
11	PASS	Dedicated PASS output
12	REC	Dedicated RECYCLEoutput
13	FAIL	Dedicated FAIL output
14	COM	Common for Strobe
15	STRB	Strobe output

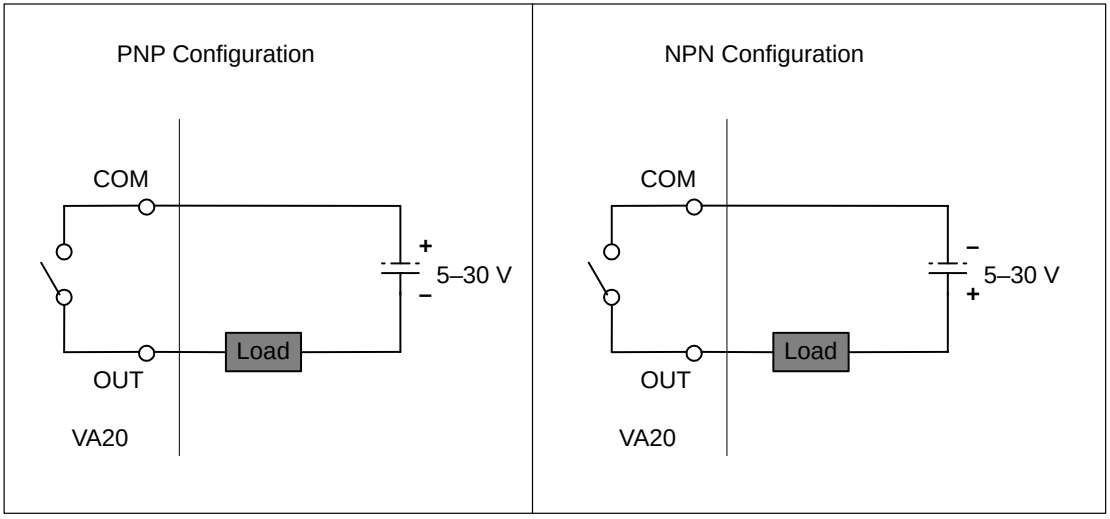

Figure 6. Output Configurations

I/O Definitions

TRIG – TRIGGER INPUT

An input from an external device, such as a photoeye, that is used to signal the Vision Appliance to acquire an image. Since the input is "edge" sensitive, the minimum pulse width is determined by the minimum input transition time, of 1 us.

SLN[0:2] INPUTS

The Solution inputs are sampled when the ACC input is strobed to dynamically select a solution (job) file to run. These inputs are level sensitive and require a 1 ms setup and hold time relative to the leading edge of the ACC pulse.

ACC INPUT

An input that is used to switch the solution file as determined by the SOLN inputs. It is a high going pulse of minimum duration 1 ms.

IN[0:3]

General purpose inputs that can be used as inspection qualifiers or controls by the application software. IN0 is the iNspect/iLabel decision trigger/sensor input, if enabled.

STB – STROBE OUTPUT

An output that, when enabled, generates a pulse after receiving an inspection TRIGGER input. The STROBE offset and duration are programmable. The STROBE pulse is used to briefly turn on (strobe) a light for the purpose of "freezing" a part in motion, eliminating motion blur.

PASS

The PASS output is a general purpose output with special function in iNspect and iLabel. When an inspection passes, a pulse is generated on this output of user-defined length and polarity. Depending upon the operational mode of the software, this is either a software or hardware controlled pulse. The hardware pulse is output when the Vision Appliance is emulating a PLC to direct parts appropriately following inspections. This is general purpose output 0 in Sherlock.

FAIL

The FAIL output is a general purpose output with special function in iNspect and iLabel. When an inspection fails, a pulse is generated on this output of user-defined length and polarity. Depending upon the operational mode of the software, this is either a software or hardware controlled pulse. The hardware pulse is output when the Vision Appliance is emulating a PLC to direct parts appropriately following inspections. This is general purpose output 1 in Sherlock.

RECYCLE

The RECYCLE output is a general purpose output with special function in iNspect and iLabel. When an inspection meets the recycle criteria, a pulse is generated on this output of user-defined length and polarity. Depending upon the operational mode of the software, this is either a software or hardware controlled pulse. The hardware pulse is output when the Vision Appliance is emulating a PLC to direct parts appropriately following inspections. This is general purpose output 2 in Sherlock.

OUT[0:3]

General purpose outputs that can be configured to output voltage levels or pulses based on user-defined criteria. Outputs 0–3 in iNspect and iLabel, outputs 3–6 in Sherlock.

System Status LED Indicators

LED	*During boot*	*Running iNspect/iLabel*	*Running Sherlock*
LED 1	On	"HeartBeat" Flashing on and off, 50% duty cycle.	On (no-op)
LED 2	On	"end of frame" Flashing on and off, at the end of each camera frame acquire.	On (no-op)
LED 3	Off (no-op)	Off (no-op)	On or Off (no-op)
SYS OK	Flashing on and off (50 % duty) during power-up boot. No-op during Windows restart.	On	Flashing or On (no-op)
Reset	VA1x/VA2x Flashes on once, then remains off. VA3x off.	Off	Off
Earth	Off (no-op)	Off (no-op)	Off (no-op)

(no-op) no operation or function attached to this LED.

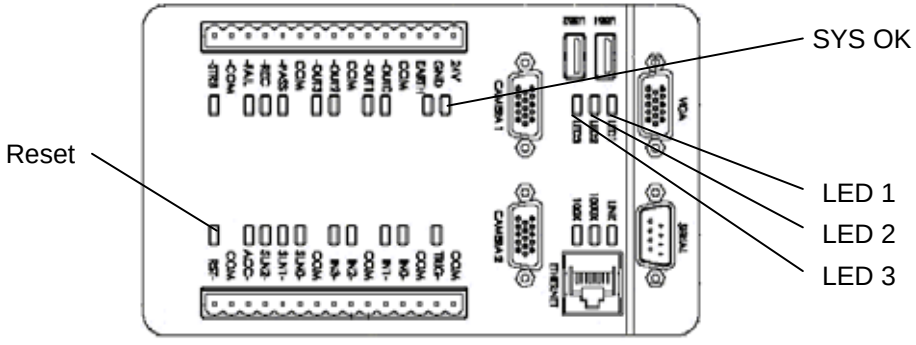

Figure 7. System LEDs

Verify Installation and Begin

Before powering on the unit, take a couple of minutes to verify your hardware installation:

1. Verify all cable connections
2. Verify all electrical connections
3. Verify all components are securely mounted.

Complete the installation by applying power to the unit. The Vision Appliance is powered from an external supply (option A-PWR-NSII) that connects to pins 1 & 2 of the Output connector. The power requirements are:

- +24 Volts +/– 5% at 1.5 A (Amperes)

The system will take about 30 seconds to boot. The LED beside +24V, the "SYS OK" LED should flash on and off until the boot process is complete, then remain on. LED1 and LED2 should be active (on), during the boot process, and then remain on until iNspect or iLabel starts.

- LED1 is the "Heartbeat" and LED2 is the Processing or "End-of-acquire" status.

The hardware installation is now complete. If you are using the **VA15, VA20, VA30** Vision Appliance, you should proceed to "Modifying the VA20Appliance Address" on page 28. If you are using the **VA21** or **VA31** Vision Appliance, you should proceed to "Changing the VA21 IP Address" on page 32.

Troubleshooting

1. You have powered the Vision Appliance and launched iNspect or iLabel, but you do not see an image on the local display.
   a. Verify the acquisition heartbeat is flashing. If it is not, a connection problem is likely. Verify the cables again.
   b. Verify that the lens aperture is not closed.
   c. Verify that the inspection area (meaning the area that the camera is viewing) is correctly illuminated.

Mounting Options

Vision Appliance Chassis

The Vision Appliance provides the means to mount to a standard DIN rail. The mounting brackets are located on the base plate of the unit.

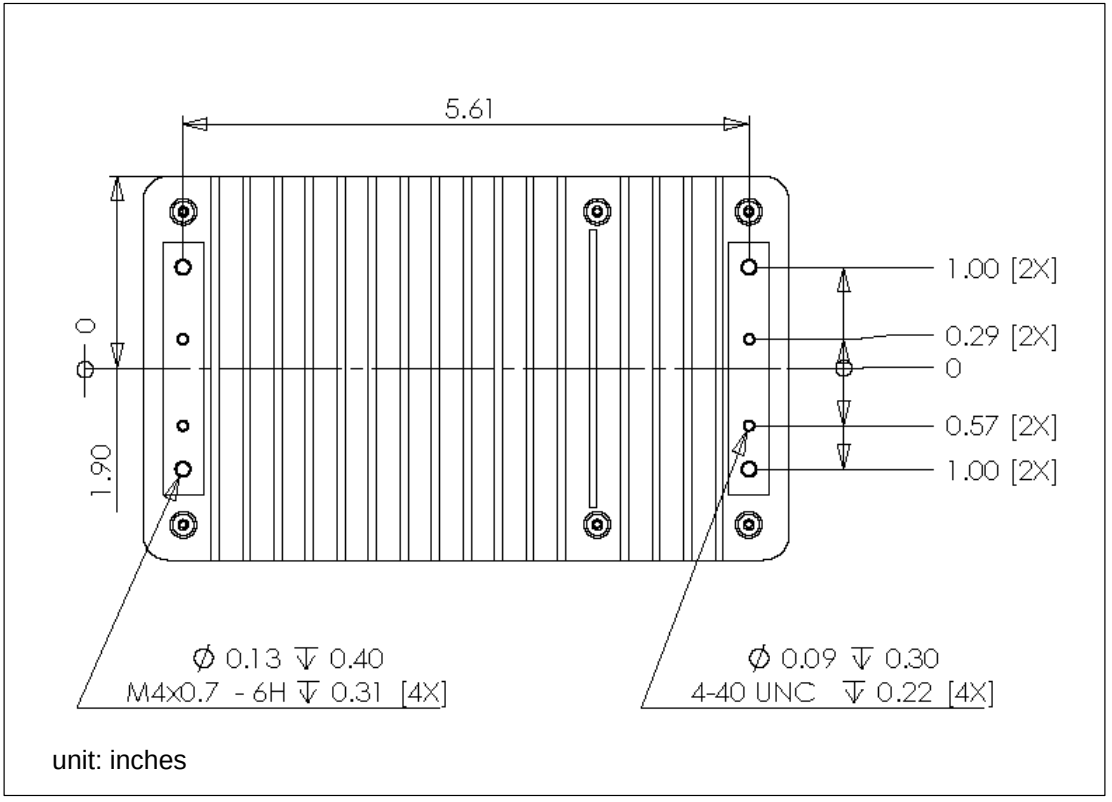

Figure 8. Chassis Mounting Holes

Cameras

The TM2, SM2 and DM1024 cameras provide mounting holes on the bottom of the camera. The location and size of the mounting holes are shown in Figure 9, and Figure 10, respectively. Tripod mounting adapters are also available for both cameras.

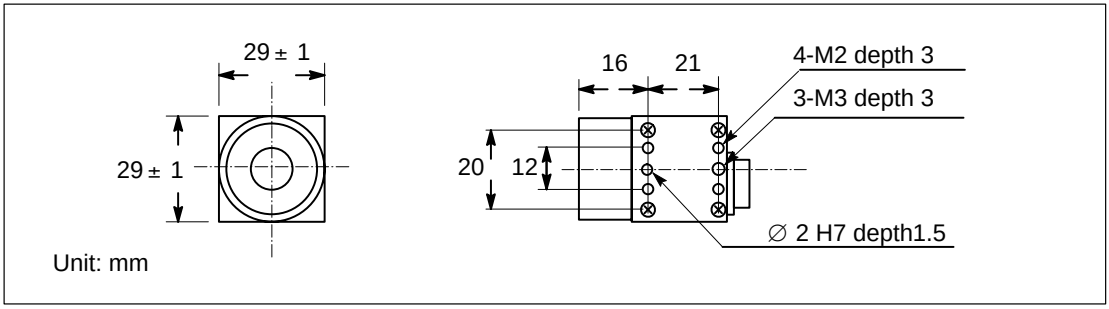

Figure 9. TM2 Camera Mounting Holes

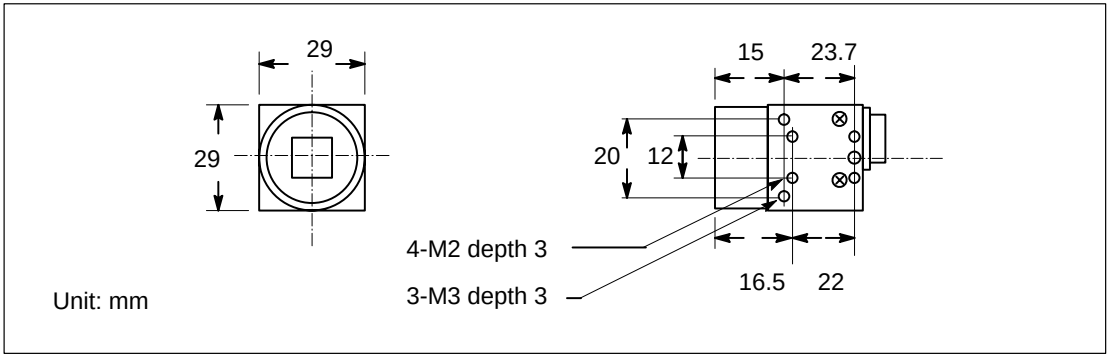

Figure 10. SM2 & DM1024 Camera Mounting Holes

Modifying the VA15, VA20, VA30 Appliance Address

The **VA15**, **VA20** & **VA30** is accessed using Internet Explorer on another PC. The **VA21** & **VA31** boots to the Windows desktop. You can change the address using the instructions on page 32.

Local PC Setup

If your PC is on a local Area Network, ask your Network Administrator to configure the Vision Appliance to a compatible Static IP Address. The Network Administrator will need to know that the VA1x/VA2x/VA3x default address is **192.168.0.100**.

If you do not have a Network Administrator, use the following steps to configure your PC to access the Appliance at its default address. You will first configure the address of your PC to be compatible with the Vision Appliance default address. Then you can access the Appliance, and make it compatible with your network. Finally, you reset your PC back to its original address.

1. Disconnect your PC from the network, and connect it directly to the Appliance with the crossover cable.
2. Open the TCP/IP Protocol Properties:
   Windows 2000
   a. go to: Start – Settings – Control Panel
   b. double-click on "Network Connections"
   c. double-click on Local Area Connection
   d. in the "Local Area Connection Status" window, click on the General tab
   e. click on the Properties button
   f. in the "Local Area Connection Properties" window, click on the General tab
   g. click on "Internet Protocol (TCP/IP)" and click on the Properties button.
   Windows XP
   a. go to: Start – Control Panel
   b. double-click on "Network Connections"
   c. double-click on Local Area Connection
   d. in the "Local Area Connection Status" window, click on the General tab
   e. click on the Properties button
   f. in the "Local Area Connection Properties" window, click on the General tab
   g. click on "Internet Protocol (TCP/IP)" and click on the Properties button.

3. Write down all of the settings in the "Internet Protocol (TCP/IP) Properties" window (or capture the screen with Alt–Print Screen, and paste it into a WordPad document). You will change these temporarily for accessing the Appliance the first time. You will need to change them back to their original settings to regain access to your network. Or, if you do not connect to a network, you can leave your PC at the "temporary address."
4. Click the radio button beside "Specify an IP Address" or "Use the following IP address" if it is not already selected. Enter the address **192.168.0.111** (see Figure 11).

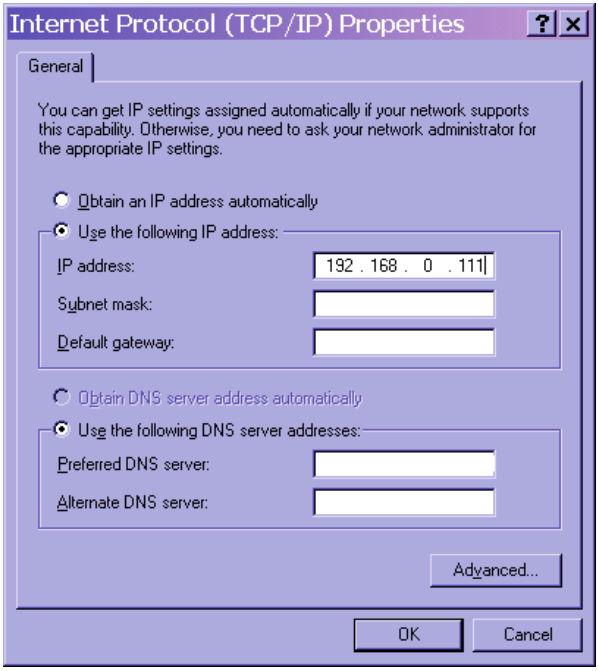

Figure 11. Temporary IP Address

The first three fields (192.168.0.) put your PC on the same address neighborhood as your Appliance. The last field (111) puts your PC at an address in this neighborhood that is different but close to the Appliance. The other addresses in this window do not need to be changed. The Appliance and PC will communicate directly, without trying to find a local gateway or server. Click OK to accept the new address and close the window. If you get a warning about the Subnet Mask, click OK. It should be filled in for you. If it is not filled in, use Subnet Mask value 255.255.255.0 and click OK. Click OK or Close in all the other open windows to accept the new address. You do not need to reboot your PC at this time.

NOTE *This address allows you to access the Appliance. You can then change the Appliance address to be compatible with your local network. You will have to change your PC back to its previous settings to reattach to your local network, and then reboot both the Appliance and the PC.*

Changing the Appliance IP Address

NOTE *If you have only one Vision Appliance, and do not connect your PC to a network or DSL, you can use the default address. Proceed to setting up the inspection.*

5. In Internet Explorer, enter the IP Address of your Vision Appliance, *without* a www. The *default address* is **http://192.168.0.100**.
6. On the Appliance Home Page, click on "Device Setup" (see Figure 12).

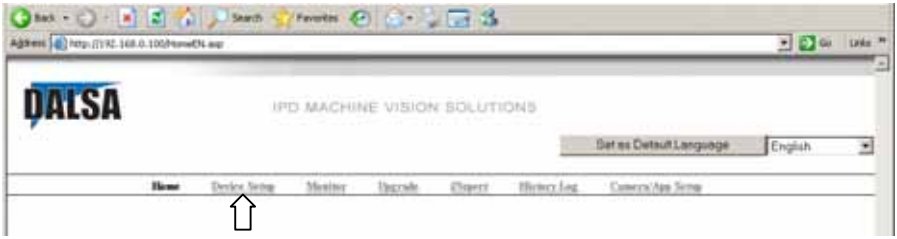

Figure 12. The Vision Appliance Home Page

- If you have more than one Appliance, you must change the last field of the address. Use sequential numbers; for example, 192.168.0.101, 192.168.0.102.
- If you are attaching the Appliance to a Network, you must change the first three fields in the Static IP Address to match your local network, and the last field to a unique number not already used by another PC or device on your network. You must change the Subnet Mask and Default Gateway to match your network. Use your original PC settings from step 3.
- If you must use Dynamic Addressing, write down the "Network Alias" of your Appliance. Click on the radio button beside "Use DHCP". The network will assign an address automatically. This address may change from day to day. You will need to "ping" the network name to obtain the address. The IP Address is displayed on the Local Display, if present. Static addressing is highly recommended because the address does not change.
- The Network Alias cannot contain spaces, and cannot start with a number.

7. After changing the Device Setup, Click "Ok" to accept your changes; or click "Reset" to discard your changes. Attach the Appliance to your network, and Reboot the Appliance (disconnect the power, or in the Internet Explorer address bar, type: **http://192.168.0.100/ResetDevice.asp**). You must use the factory address the first time you

change the address. Reboot takes 1 minute. In the future, you would use your new IP Address for this reset command, not the factory address.

8. Repeat steps 2 through 3 to change your PC back to its original address settings.
9. Attach your PC to the network cable, and reboot the PC.

NOTE **After making changes to the Device Setup page, you must click "Ok" to accept your changes, and then Reboot the Appliance.**

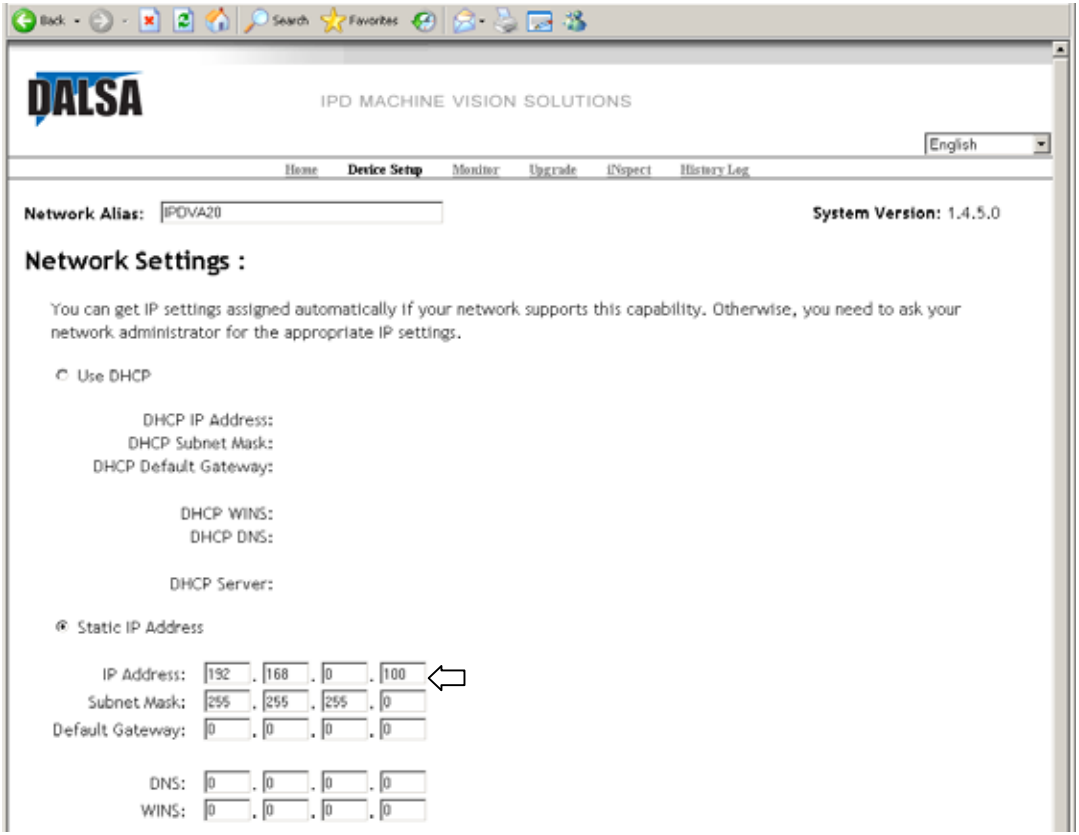

Figure 13. Device Setup Page

NOTE *If you incorrectly set, or forget, your network ID or IP Address, connect a monitor to the Vision Appliance. The IP Address and port number are displayed on the monitor; for example,* "Server address: 192.168.0.100.5005". *The IP Address is* 192.168.0.100 *and the port number is* 5005.

Internet Explorer Setup

10. Open Internet Explorer. Pull down the "Tools" menu, and select "Internet Options".

11. Click on the "Connections" tab at the top of the Internet Options window.
12. Click on the "LAN Settings" button.
13. If the check box under "Proxy Server" is empty, click Cancel. Click OK to close the Internet Options, and proceed to setting up the inspection.
14. If the check box under "Proxy Server" is checked, click on the "Advanced" button.
15. In the field under "Exceptions" enter the IP Address of your Vision Appliance(s). Click OK to exit Proxy Settings. Click OK to exit LAN Settings. Click OK to exit Internet Options.

Changing the VA21, VA31 IP Address

The **VA21** & **VA31** Vision Appliance boots to the Windows desktop.

1. Open the TCP/IP Protocol Properties:

Windows XP

a. go to: Start – Settings – Network Connections
b. double-click on "Local Area Connection"
d. in the "Local Area Connection Status" window, click on the General tab
e. click on the Properties button
f. in the "Local Area Connection Properties" window, click on the General tab
g. click on "Internet Protocol (TCP/IP)" and click on the Properties button.

2. If you have a DHCP server, click on "Obtain an IP address automatically".
   Or, if you need to use a Static Address you can change the value beside "IP Address". The new address must be compatible. The first three fields (192.168.0.) define the "address neighborhood" These should be the same as other equipment of PCs you are using. The last field (100) should be unique, or different from all other equipment, but a value near to the other equipment. The other addresses in this window do not need to be changed.
3. Click OK to close the window. You do not need to reboot.

Camera Configuration

The Appliance is configured for the camera ordered with the unit, before shipping from DALSA.

VA15/VA20/VA30

Camera selection is changed on the Camera/App Selection page, accessed from the Appliance Home page. This page also allows you to switch from iNspect to iLabel, or back again. The current application appears between "Upgrade" and "Camera/App Select". This page also allows you to rotate and tile images, and enable or disable the Recycle tolerance in measurements.

NOTE *If a saved Solution is not compatible with the selected camera, it will not load or run. The software will default to* "Start New Solution".

To change the camera or application

Click on a camera name (or application). On the confirmation page, click Switch. Then Click Yes to close the Internet Explorer session while the Vision Appliance reboots. The **DM1024** camera uses the SM2 setting.

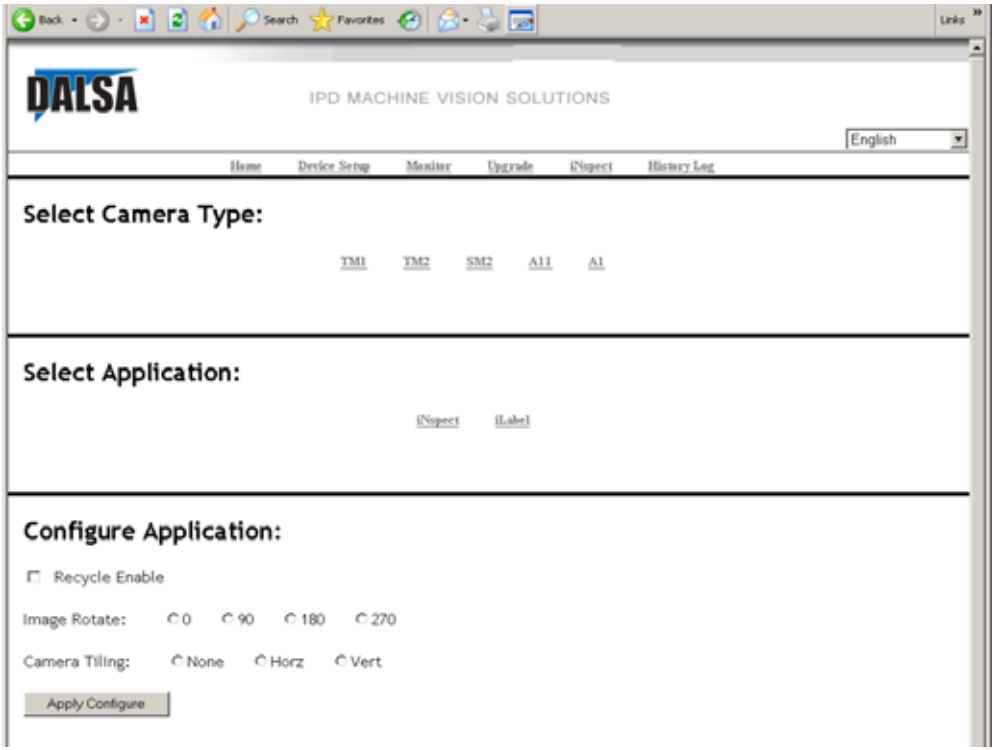

Figure 14. Camera and Application Selection Page

VA21/VA31

NOTE *The Vision Appliance does not support running more than one video acquisition program at one time; such as, iLabel, iNspect, Sherlock, Camera Configurator or IFC examples.*

iNspect/iLabel

The "Camera and Language Selector" in Figure 15, allows you to change the camera for the *iNspect and iLabel* applications. This page also allows you to rotate and tile images, and enable or disable the Recycle tolerance in measurements. The "Camera and Language Selector" *does not* select the camera for the *Sherlock* application. The DM1024 camera uses the SM2 setting.

The iNspect or iLabel application uses a Camera Configuration file "MSAtest.txt" located in C:\iNspect for VA21, or located in D:\iNspect for VA31. This file defines the image size and parameters required to interface a particular camera. When you select a camera in the Camera and Language Selector, a camera file is copied from \iNspect\CamFiles to \iNspect, and named "MSAtest.txt". The Camera type and setting changes you make in the iNspect/iLabel "Sensor Setup" page are saved in the Solution file.

NOTE *If a saved Solution is not compatible with the selected camera, it will not load or run. The software will default to* "Start New Solution".

The "Sensor Setup" page covers almost all changes needed for camera settings. If you need additional changes that are not supported (trigger or strobe polarity) use the IFC Camera Configurator to save your own configuration file, or edit one of the text files in the CamFiles directory. You should save your file to the iNspect\CamFiles direcotry, and preface the name with "MSAVA" similar to the other files there.

Sherlock

There are detailed instructions in the Sherlock Help and Sherlock Software User's Reference Manual for enabling acquisition and selecting the camera configuration file.

The Sherlock software uses a Camera Configuration file usually found in the directory C:\IFC59\Config or in D:\IFC59\Config. There are several camera files located there. These are "portable" configuration files saved using the IFC Camera Configurator. The files in C:\IFC\Config\MSA\camdb are the original IFC library camera definitions. The DM1024 camera uses the SM2 configuration files.

If you or your integrator modify the camera configuration files, they should be saved as "protable" configuration files, in \IFC59\Config. You can use the IFC Camera Configurator to edit settings, or edit the text files.

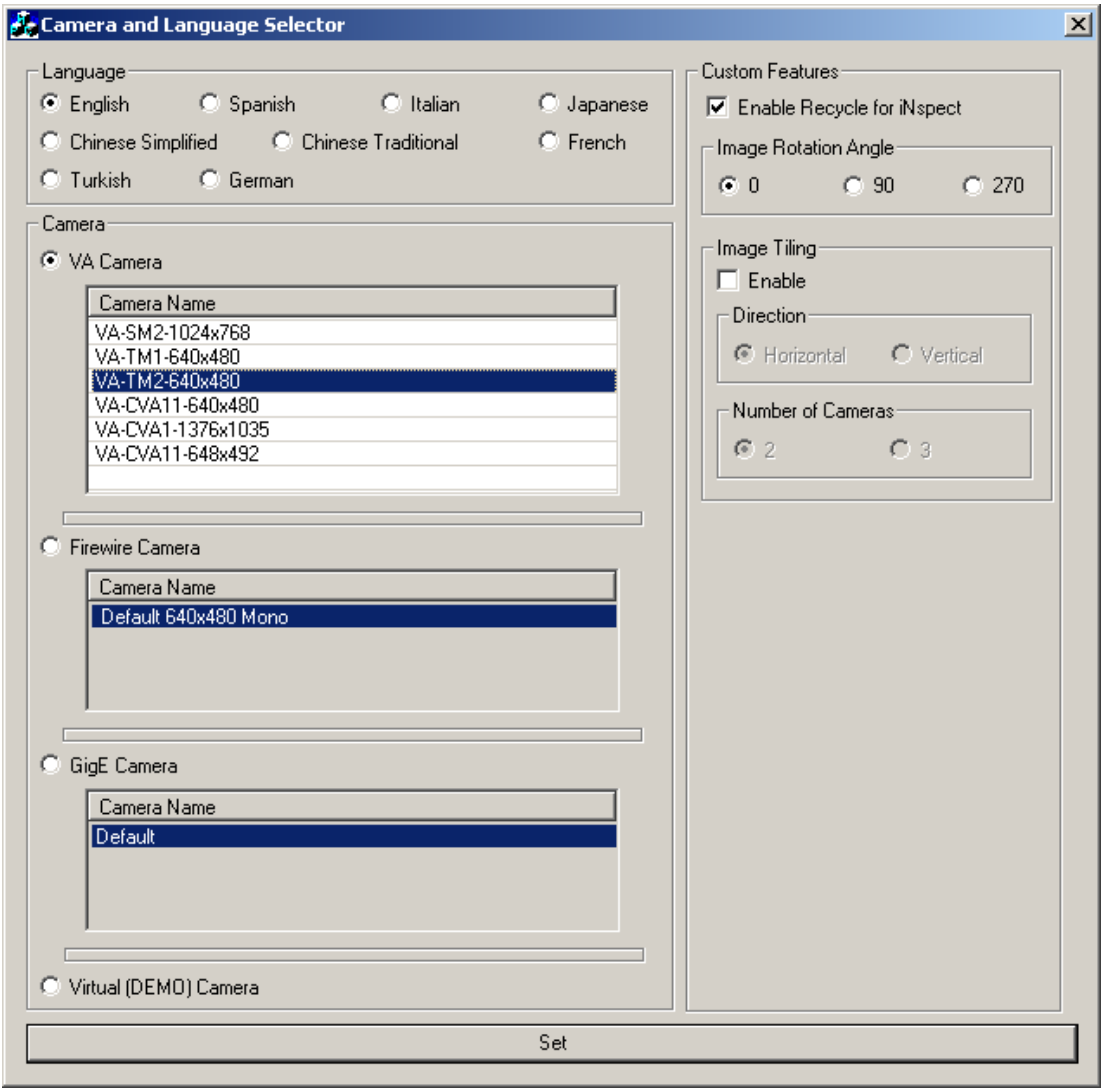

Figure 15. Camera and Language Selector

Software Upgrades – VA15, VA20, VA30 only

Software Upgrades for the **VA15/VA20/VA30** may be available from your local distributor. A software upgrade erases all solutions saved to the Appliance memory. You may want to Export all your saved Solutions, and perform a Backup (next page), before performing an upgrade.

NOTE *Solutions from previous software versions may not be forward compatible. If this is important to you, please check with your local distributor before upgrading your appliance.*

a. Open the Application window.

b. Export all your Solutions to a network device, if you have not already done so. All saved Solutions are deleted during the upgrade process.

c. Go to the Select Solution panel, and click on "Select New Solution". This will delete the current running Solution. Running a Solution and processing frames will greatly slow down the upgrade process.

d. Close the Application (client) window.

e. Shut down any external trigger signals connected to the Appliance, or disconnect the I/O cable.

f. On the Vision Appliance home page, click on "Upgrade". The Upgrade page shows the current software version.

g. Click on the "Browse" button, and navigate to the upgrade package you saved on your network. Select the binary upgrade file.

h. On the Upgrade page, click on the "Upgrade" button.

Figure 16. Upgrade Page

i. The progress bar will indicate the upgrade file is loading. This will take between one and two minutes, and may appear to stop at different intervals.

NOTE *If the progress bar goes immediately to 100%, the file copy failed. Click on Upgrade again.*

j. After the upgrade file has been copied, you will be prompted to reboot the Appliance. Click "Ok". The Appliance will reboot itself. The upgrade reboot will take about 2 minutes.

k. Close your Internet Explorer window. Do not try to go to the Appliance home page, it will not respond during the reboot.

l. Run the "iAssistant" program from your desktop (Start > Run > iAssistant) found in directory: \WINNT\System32 (Windows 2000 and NT), or in \Windows\System32 (XP).

m. Click on "Clean" This process will remove old files from your local PC.

n. Click on "Close" to exit iAssistant.

o. Open Internet Explorer. Navigate to the Appliance home page. You can use the History drop-list feature of the Address Bar to enter the Appliance IP Address.

p. Click on "iNspect". The appliance will copy a new version of the OCX to your PC.

You can run iAssistant at any time to see if your PC contains the latest version of files.

Software Backup

A Backup saves the iNspect/iLabel Application software and all the Solutions saved on the Appliance, in a single binary file. Password, Language selection, IP Address and Network settings are not saved to the backup file. The Appliance, Solution, and Client Application may be running while you run backup; however, the process may cause the Appliance to skip parts. We recommend you back up the Appliance when you are not inspecting parts.

A network or hard-disk glitch during the backup process could make the backup and restore fail. You may want to export all your saved Solutions before a backup, for redundancy. If the backup is successful, try the Restore. If the restore is also successful, you can safely delete the exported Solutions.

Software Restore

A Restore loads a backup file, containing both the iNspect/iLabel Application and Solutions. Password, Language selection, IP Address and Network settings are not saved to the backup file. All Solutions saved on the Appliance are deleted before the restore begins.

To restore a backup:

a. Close the iNspect application window (client) if open.

b. On the Vision Appliance home page, click on "Upgrade".

c. Select the Restore option on the Upgrade page, and use the Browse button to find the backup file.

d. Click on the "Restore" button.

e. After the backup file has been copied, you will be prompted to reboot the Appliance. Click "Ok", and remove power to the Appliance.

f. Close your Internet Explorer. Do not try to go to the Appliance home page, it will not respond.

g. Reconnect power to the Vision Appliance. This forces the FPGA to reload from your backup file.

h. Run the "iAssistant" program from your desktop (Start > Run > iAssistant) found in directory: \WINNT\System32 (Windows 2000 and NT), or in \Windows\System32 (XP).

i. Click on "Clean" This process will remove old files from your local PC.

j. Click on "Close" to exit iAssistant.

k. Open Internet Explorer. Navigate to the Appliance home page. You can use the History drop-list feature of the Address Bar to enter the Appliance IP Address.

l. Click on "iNspect". The appliance will copy a new version of the OCX and support files to your PC.

Software Upgrades – VA21, VA31

1. Download the new software version.
2. Use Add/Remove programs to uninstall the previous version from your Vision Appliance or PC.
3. **Reboot** after the uninstall is complete. (you must reboot before installing new software).
4. Remove any remaining files from the old version (in C:\iNspect or D:\iNspect).
5. Double–click on setup.exe in the new software folder.

APPENDIX A
CONNECTOR PINOUTS

This section provides the connector pinout information for each of the external interfaces.

Camera Connectors

Cameras interface through 15-pin D-Sub connectors on the front panel . **VA2x/VA3x** supports simultaneous capture and processing from 2 monochrome cameras. **VA15** supports one camera.

NOTE: Each D-Sub cable can supply up to 0.5 A at +12 Volts from chassis power.

Video Connector Pinout

Pin	*Name*	*Direction*	*Description*
1	NC	–	not connected
2	Video	In	Monochrome Video
3	NC	–	not connected
4, 5	DGND	–	Digital ground
6,7,8	AGND	–	Video signal ground
9	Camera TRIG	Out	Frame Reset (exposure control)
10	DGND	–	Digital ground
11	RX	In	Serial receive data (CV-A cameras only)
12	TX	Out	Serial transmit data (CV-A cameras only)
13	HD	Out	Horizontal Drive
14	VD	Out	Vertical Drive
15	Power	Out	+12 V @ 0.5 A

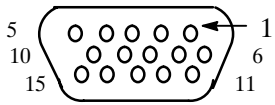

Figure 17. Camera Connector

Camera Electrical Specifications

Pin	*Electrical Specification*			
Video Inputs	AC coupled, 75 ohm terminated			
	Logic 0		Logic 1	
	Min.	*Max*	*Min.*	*Max*
Trigger Input	0	0.8 V	2	5.5 V
HD/VD Outputs	0	0.5 V	2.4 V	5.5 V

Power Connections

The Vision Appliance is powered from an external supply (option A-PWR-NSII) that connects to pins 1, 2, and 3 of the "Output and Power" connector (refer to Figure). The power requirements are:

+24 V +/–5% @ 1.5 A maximum.

I/O Connector Pinout

Pin	*Name*	*Direction*	*Description*
1	+24V	Input	DC Power
2	GND	–	Ground
3	ERTH	–	Earth or Common

Input Connector

The inputs are opto-isolated, polarity insensitive pairs (NOTE: some common pins are shared) that can be connected to either sourcing (PNP) or sinking (NPN) outputs. They require no external pull-up or pull-down resistors and can accept input voltage levels from 2 Volts to 24 Volts.

Input Electrical Characteristics

Signal state	*Min.*	*Max.*
Low (Inactive)	0 V	0.8 V
High (Active)	2.4 V	60 V *
Turn ON current	1 mA	
Isolation		5000 V
Max Current		50 mA
Switch point	2 V	10 V
De-bounce	2 us	500 us
Input Response	1 us	

* observe maximum current specification. Current limiting resistor required above 24 Volts.

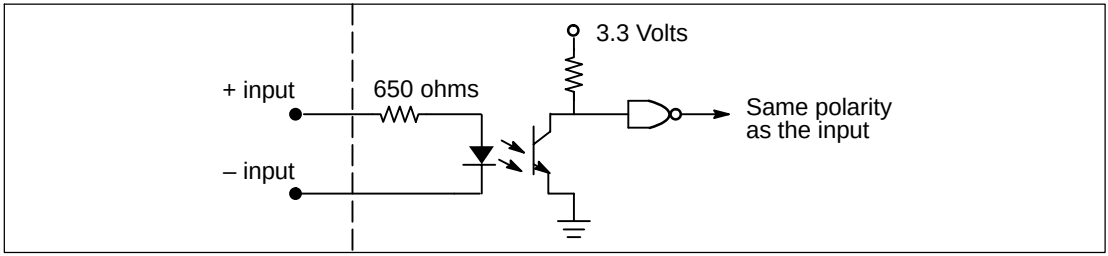

Figure 18. Opto-Isolated Inputs

Input Connector Pinout

Pin #	*Label*	*Description*	*iNspect/iLabel*	*Sherlock*
1	COM	Common for Trigger inputs		
2	TRIG	Sensor Trigger input		
3	COM	Common for Inputs 0 and 1		
4	IN0	Input 0, or decision trigger input	GPI0 or Decision trig	Input 4
5	IN1	Input 1	GPI1	Input 5
6	COM	Common for Inputs 2 and 3		
7	IN2	Input 2	GPI2	Input 6
8	IN3	Input 3	GPI3	Input 7
9	COM	Common for Solution inputs		
10	SLN0	Solution select bit 0	Solution ID 0	Input 0
11	SLN1	Solution select bit 1	Solution ID 1	Input 1
12	SLN2	Solution select bit 2	Soultion ID 3	Input 2
13	ACC	Accept, Latch for solution select	Change solution	Input 3
14	COM	Common for Reset		
15	RST	Reset input VA3x only		

Output and Power Connector

The outputs are opto-isolated solid-state relays that can operate up to 30 Volts. They can be visualized as mechanical switches. They are analog, polarity insensitive and exhibit no contact bounce. The outputs can drive both AC and DC loads providing the current and voltage limits are observed.

Output Electrical Characteristics

Signal state	*Min.*	*Max.*
Voltage	5 V	30 V
Current		300 mA
Rise time		2 ms
Fall time		2 ms

Output Connector Pinout

Pin #	*Label*	*Description*	*iNspect/iLabel*	*Sherlock*
1	24V	Power input supply voltage 24 V		
2	GND	Power input ground 0V		
3	ERTH	EARTH connection for system		
4	COM	Common for Output 0 and 1		
5	OUT0	Output 0, general purpose output	GPO0	Output 3
6	OUT1	Output 1, general purpose output	GPO1	Output 4
7	COM	Common for Output 2 and 3		
8	OUT2	Output 2, general purpose output	GPO2	Output 5
9	OUT3	Output 3, general purpose output	Ready/running	Output 6
10	COM	Common for PASS/FAIL/RECYCLE		
11	PASS	PASS output	PASS	Output 0
12	REC	RECYCLE output	RECYCLE	Output 2
13	FAIL	FAIL output	FAIL	Output 1
14	COM	Common for Strobe		
15	STRB	Strobe output		

Display (VGA) Connector

A standard 15-pin female D-Sub connector provides for VGA Display. See Figure 19.

Display Pinout

Pin	*Name*	*Direction*	*Description*
1	RED	Out	Red
2	GREEN	Out	Green
3	BLUE	Out	Blue
4	NC	–	not connected
5–8	GND	–	Ground
9	+5V	Out	+5 V
10	GND	–	Ground
11	NC	–	not connected
12	SDA	I/O	Serial data
13	HS	Out	Horizontal Sync
14	VS	Out	Vertical Sync
15	SCL	I/O	Serial data clock

Serial Port Connector

A standard 9-pin male D-Sub connector provides for serial port I/O. See Figure 19.

Serial Pinout

Pin	*Name*	*Direction*	*Description*
1	DCD	In	Data Carrier Detect
2	RXD	In	Receive Data
3	TXD	Out	Transmit Data
4	DTR	In	Data Terminal Ready
5	GND	–	Ground
6	DTS	Out	Data Set Ready
7	RTS	Out	Request to Send
8	CTS	In	Clear to send
9	RI	In	Ring Indicator

Figure 19. Display and Serial Port Connectors

USB Connectors

The two USB 1.1 connectors are identical, rectangular type-A, 4-pin sockets.

USB Pinout

Pin	Name	Direction	Description
1	VCC	Out	Power, +5 V (1 A max)
2	DATA–	I/O	Data–
3	DATA+	I/O	Data+
4	GND	–	Ground

Ethernet Connector

The Ethernet RJ-45 connector is an 8-pin male connector.

Ethernet Pinout

Pin	Name	Direction	Description
1	TD+	Out	Transmit Data+
2	TD–	Out	Transmit Data–
3	RD+	In	Receive Data+
4–5	NC	–	not connected
6	RD–	In	Receive Data–
7–8	NC	–	not connected

APPENDIX B
STAGING AND PRESENTATION

To measure or inspect a part or object, it must be positioned so the camera can see it. Positioning, sometimes called *staging*, *presentation*, or *fixturing*, puts the part in the camera's field of view (FOV), signals the Vision Appliance that a part is available, and helps hold the part steady while an image is being taken.

The camera is responsible for generating an electronic image of the part for processing by the Vision Appliance. The camera and lighting help with the part positioning because they are used to "freeze" or "stop" the motion of a moving part.

An Example

Figure 20 illustrates a bottle inspection line, seen from above. The bottles move along a conveyer belt, past the camera. The conveyer belt positions the bottle in front of the camera, so that the camera can capture an image of the threading on top of the bottle's neck.

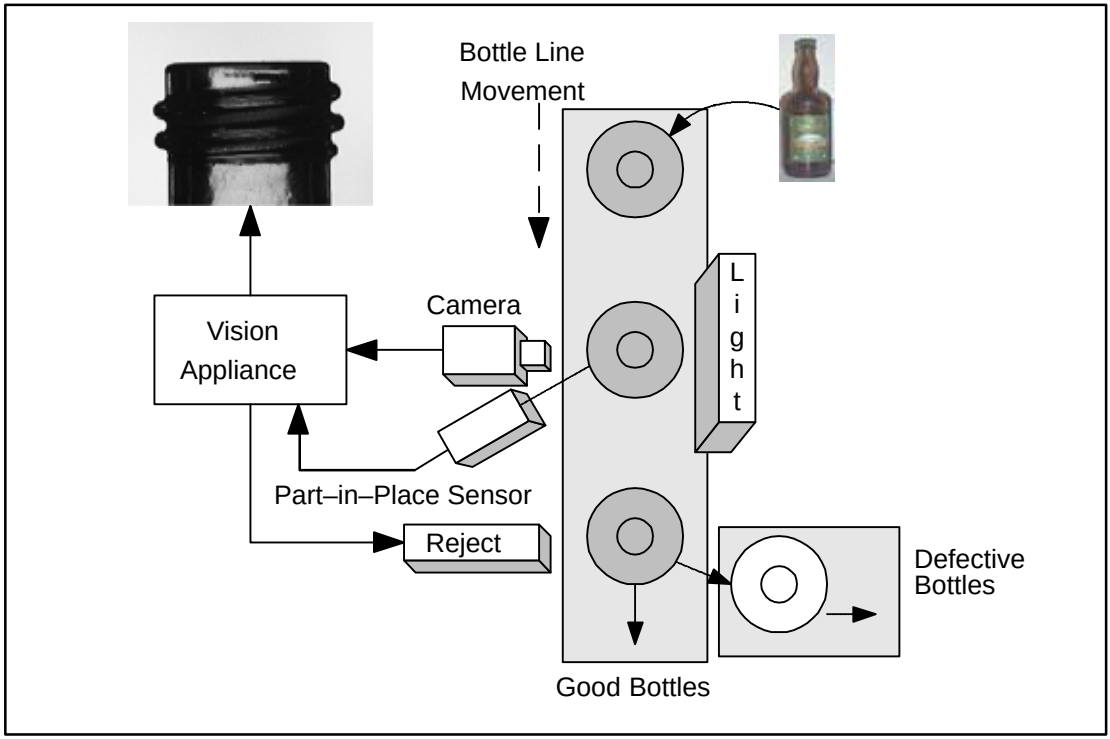

Figure 20. Bottle Inspection Line

A diffuse, uniform light behind the threads gives a sharp, high-contrast image of the threads. The Vision Appliance inspects this image and signals a rejection "kicker" to move defective product off the production line.

Part-in-Place Sensor

In this example we have two problems because the parts (bottles) move. We first have to know when a bottle is in front of the camera so it can "see" the threads. One solution is to have the Vision Appliance look for the threads, and only take an inspection image when the thread is centered in the field of view. A simpler approach is to have a separate Part-in-Place (PiP) sensor that detects when the bottle is in the correct position. A PiP sensor allows the Appliance to work at higher part speeds. We have used inexpensive, PiP sensors from HTM Electronics Industries (http://www.htm–sensors.com) and from Banner Engineering (www.bannerengineering.com).

Reducing Blurring Caused by Part Motion

The second problem is blurring caused by motion of the part. When the part is in place, the motion of the part must be "frozen" so that the image of the part is not blurred by the motion. Sometimes the part is stopped while a picture is taken. This is ideal for the best measurement accuracy. With continuous motion, as on a conveyer belt, we rely on the camera and lighting to "freeze" the motion.

The camera used with the Vision Appliance has a programmable exposure time so you can set the part viewing time. Selecting the viewing time depends on the part speed, the amount of blurring due to motion that can be tolerated, and the amount of available light. The shorter the viewing time, the more light is needed to see the part. The camera also has an electronic shutter, but this is automatically adjusted for you.

Assuming that only one part is in the field of view at a time, an estimate of the viewing time can be derived from the following equation:

View Time in seconds = B/(P*I)

where:

B is the amount of blur you can tolerate (in pixels),

P is the number of pixels per image (image size) in the direction of motion,

I is the number of images taken per second, or the number of parts per second.

For example, if the motion is horizontal with respect to the camera, and the picture size is 640 pixels per horizontal line, then P=640. If you are inspecting 5 parts per second (I=5), and can tolerate one pixel of blurring (B=1) then:

View Time = 1/(640*5) = 315 microseconds

This is within the camera exposure range (and shutter speeds) but will require good illumination, perhaps by an LED strobe, because the exposure time is brief.

You adjust the camera's exposure time using the Exposure Control slider on the Vision Appliance's Sensor Setup screen. This slider can range from 0 (no exposure – black screen) to 1023 (longest exposure) in steps of roughly 64 microseconds, starting at 1 = 32 microseconds. The exact times on this control are in increments of the RS-170 horizontal line time of 63.556 microseconds. In practice, you will adjust the exposure to balance good image contrast against visible blur due to part motion.

Blurring of the image caused by the motion of the part (*motion blur*), even when not visible to the human eye looking at the camera image, will reduce the accuracy of measurements. Ideally, measurements should be performed on a part that is not moving, so there is no motion blur and so that a longer exposure (and smaller lens aperture) can be used.

Progressive Scan Cameras

In addition to programmable exposure, the camera is non-interlaced (usually called *progressive scan*). If you intend to use a different camera with your Vision Appliance, call ipd for supported cameras. Make sure that it is progressive scan, has an electronic shutter, and is compatible with the control signals, power, and cabling.

Strobe Lighting

A strobe light provides a brief, high-intensity pulse of light that can help reduce motion blur and still provide adequate illumination to the part being inspected. Traditional xenon strobe lights are bright and can be very short in duration, less than 100 microseconds, to "freeze" the part motion. Xenon strobes have substantial variability in intensity. This can create variations in the image quality, which could be mistaken for variation in the part quality. Xenon strobe lights are used only when there is no easier way to get short, high-intensity light. LEDs (Light Emitting Diodes) can also be used as a strobe, and over-driven to give a short, bright pulse of light.

Even with a strobe illumination source, you need a camera with an electronic shutter and exposure time to prevent ambient light from contaminating the image. The Vision Appliance has a dedicated I/O line for firing a fast strobe, because this must be done at a certain time after the exposure has been triggered. Longer duration light, for example LEDs again, can be controlled using a standard I/O line, and are turned on before the camera's exposure is triggered and turned off after the exposure is done. This minimizes the intensity variation on different exposures.

Using Contact Closures

Mechanical contacts, such as switches or relays, typically exhibit "bounce." The moving contact makes the electrical circuit by touching a fixed contact, but then bounces off this fixed contact. The result is a series of rapid closing and openings of the contact until the moving contact stops bouncing. Bouncing typically continues for less than 10 milliseconds, but the duration depends on mechanical factors of the switch. This oscilloscope trace shows about 5 ms (milliseconds) of bounce when a switch is closed:

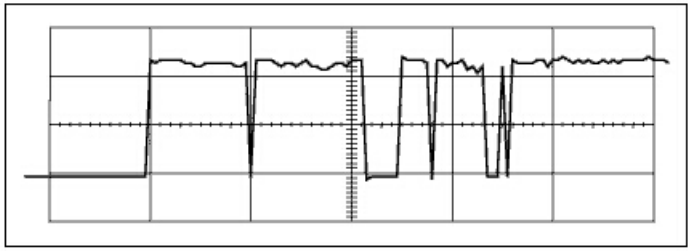

Figure 21. Example of switch "bounce" during a contact closure

From *Switch Bounce and Other Dirty Secrets*, Maxim Integrated Products, Inc., Sept. 2000

The problem is, the Vision Appliance "sees" the bouncing as multiple, rapid input signals. For example, if your "part in place" sensor is a mechanical switch (say, a photocell running a relay), the contact bounce will make it appear as if many parts were being presented to the Vision Appliance in a few milliseconds.

Here are three ways to deal with bounce. (1) Use a signal that does not bounce; for example, from a photoelectric sensor. (2) Use the built-in de-bouncing circuits. The de-bounce circuit delays the Appliance from responding to the input for some number of microseconds (us) to allow time for the contact to settle. The de-bounce time can be programmed through the camera configuration file. (3) Externally de-bounce the switch closure using commercial de-bounce chips (for example, the Maxim MAX6816), or a low-pass filter and Schmitt trigger.

Both the Vision Appliance and external de-bounce circuits delay the input signal by the de-bounce period. This delay is rarely long enough to be a problem, but might have to be considered in very high-speed applications where any delay might mean the parts being inspected move partially out of the field of view.

Using Photo-Sensors

HTM Electronics Industries (http://www.htm–sensors.com) and Banner Engineering Corp. (http://www.bannerengineering.com) and several other manufacturers make photoelectric sensors that do not require de-bouncing. The HTM Electronics MP-D0380D-CX9Q4UE infrared sensor, and the Banner Engineering R55F series photoelectric sensors and the SM312 LVAGMHSQD photoelectric sensor have been used successfully with the Vision Appliance. These sensors are rated to operate on 10 to 30 VDC; but *do not exceed* 24 VDC or you will damage the Vision Appliance.

The following diagram shows how to connect these photoelectric sensors. The wiring is:

Brown - Power (+16 to +24 Volts DC)

Blue - Ground

Black - Signal from photoelectric sensor. Goes high (to about the power voltage) when triggered.

The other two wires are *not needed* for using the sensor with the Breakout Board. These two wires are:

White - Signal from photoelectric sensor – connects a small load to ground (see sensor specification)

Gray - Can be connected to a switch to ground; when closed, enables Remote Teach

The photoelectric sensor draws power from the brown and blue leads. When the photoelectric sensor is triggered the output (black lead) goes high (to about the power supply voltage).

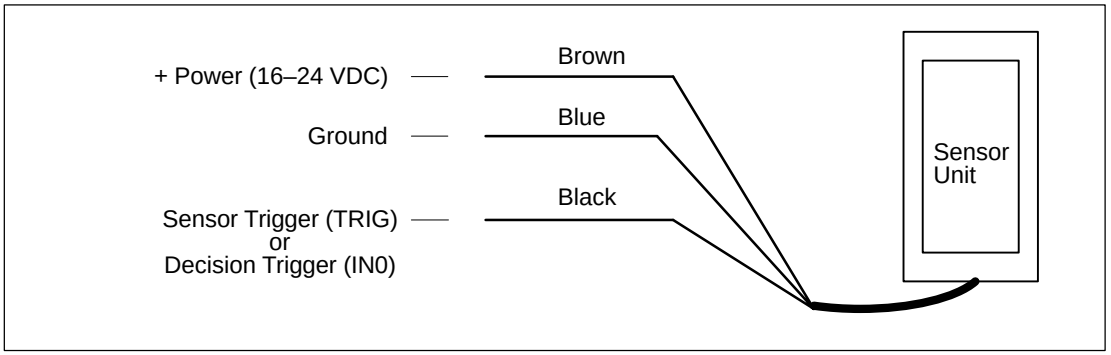

Figure 22. Photosensor Connections

APPENDIX C
SHERLOCK DIGITAL I/O ASSIGNMENTS

The standard digtial I/O assignments are given in the following table. The Trigger input (TRG) and Strobe output (STRB) are not available to Sherlock for I/O. There are 7 outputs on the VA1x/VA2x/VA3x; there is no Output Channel 7.

Default Digital I/O Definitions

I/O Connector Pin	*Direction*	*Sherlock Digital I/O*
SLN0	in	Input Channel 0
SLN1	in	Input Channel 1
SLN2	in	Input Channel 2
ACC	in	Input Channel 3
IN0	in	Input Channel 4
IN1	in	Input Channel 5
IN2	in	Input Channel 6
IN3	in	Input Channel 7
PASS	out	Output Channel 0
FAIL	out	Output Channel 1
REC	out	Output Channel 2
OUT0	out	Output Channel 3
OUT1	out	Output Channel 4
OUT2	out	Output Channel 5
OUT3	out	Output Channel 6

NOTE: The Genie camera outputs may appear starting at output Channel 0, and renumber the output channels of the VA31.

APPENDIX D
CAMERA EXPOSURE CONTROL

Cameras supplied by DALSA ipd are configured for Triggered Operation, and for Pulse Width Control (PWC or E-shutter) of the exposure. The camera takes a picture each time it receives a triggering signal (Frame Reset) from the Vision Appliance. The trigger signal is generated from an internal software trigger or from an external event (sensor, PLC, etc.) connected to the Vision Appliance.

In iNspect and iLabel, the exposure is interactively controled by a slider on the Setup Sensor panel, but in Sherlock the Exposure is set in the Camera Configuration file. The pulse width of the trigger (Frame Reset) signal to the camera, determines the exposure time. Exposure times can range between 1/30 second, to as high as 1/100000 second. Refer to the camera specifications for the supported range.

The following Table maps shutter speed to pulse width.

Shutter Speed	*Frame Reset Size (pulse width) **
1/30	33,333 us
1/60	16,667 us
1/125	8,000 us
1/250	4,000 us
1/500	2,000 us
1/1000	1,000 us
1/2000	500 us
1/4000	250 us
1/8000	125 us
1/10000	100 us
1/12000	83 us
1/20000	50 us
1/40000	25 us
1/80000	12 us
1/100000	10 us

* Frame Reset Size is the parameter that sets the pulse width out to the camera. This parameter must be modified in the camera configuration file.

** Exposure times in between the values in the table are also valid. The values in the table were chosen for quick reference and convenience.

Setting the Exposure Time

In iNspect and iLabel, the exposure is controled by a slider on the Setup Sensor panel, but in Sherlock the Exposure is set in the Camera Configuration file.

1. Run the IFC Camera Configurator utility, from the Windows Start button.

2. From the File menu, select "Open Config File" to load in the proper configuration file. The files are found in the \IFC59\Config\msa\Camdb directory. Pick the file which matches your camera:

MSVA-CVA1-1376x1034.txt – JAI CV-A1 high resolution, single camera

MSVA-CVA1-1376x1035x2.txt – JAI CV-A1 high resolution, two cameras

MSVA-CVA11-640x480.txt – JAI CV-A11 standard resolution, single camera

MSVA-CVA11-640x480x2.txt – JAI CV-A11 standard resolution, two cameras

MSVA-SM2-1024x768.txt – Sony XC-HR70 high resolution, single camera

MSVA-SM2-1024x768x2.txt – Sony XC-HR70 high resolution, two cameras

MSVA-TM1-640x480.txt – Teli CS8550Di standard resolution, high speed, single camera

MSVA-TM1-640x480x2.txt – Teli CS8550Di standard resolution, high speed, two cameras

MSVA-TM2-640x480.txt – Teli CS8560D standard resolution, high speed, single camera

MSVA-TM2-640x480x2.txt – Teli CS8560D standard resolution, high speed, two cameras

3. To find the Frame Reset Size parameter, click on the **TrigStrb** tab at the bottom of the Parameter Name/Value listing, in the left panel (Config View) of the Configurator Window. Frame Reset Size is located halfway down the list. Refer to the Configurator Help or the User Manual.

4. Edit the parameter by clicking inside the value text box and enter the desired value.

5. ***Very Important:*** To save the file properly, go to the File menu and select "Generate Portable Config File". Several dialog boxes will pop up and prompt you to save and overwrite the existing files. Click on -> Yes, OK, Save, and Yes respectively to each of the 4 screens.

6. Restart Sherlock, and the new exposure setting will now take affect.